

# SEQUENCE LISTING

<110> Goodman, Corey  
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<120> Modulating Robo: Ligand Interactions

<130> B98-031-3

<140>

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<150> 60/065,544

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<160> 20

<170> PatentIn Ver. 2.0

<210> 1

<211> 4758

<212> DNA

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<221> CDS

<222> (1)..(4575)

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gga acc agc ttc cac ggc tgc atc cgg aac ctt tac atc aac agt gag Gly Thr Ser Phe His Gly Cys Ile Arg Asn Leu Tyr Ile Asn Ser Glu 1300 1305 1310	3936
ctg cag gac ttc cag aag gtg ccg atg caa aca ggc att ttg cct ggc Leu Gln Asp Phe Gln Lys Val Pro Met Gln Thr Gly Ile Leu Pro Gly 1315 1320 1325	3984
tgt gag cca tgc cac aag aag gtg tgt gcc cat ggc aca tgc cag ccc Cys Glu Pro Cys His Lys Lys Val Cys Ala His Gly Thr Cys Gln Pro 1330 1335 1340	4032
agc agc cag gca ggc ttc acc tgc gag tgc cag gaa gga tgg atg ggg Ser Ser Gln Ala Gly Phe Thr Cys Glu Cys Gln Glu Gly Trp Met Gly 1345 1350 1355 1360	4080
ccc ctc tgt gac caa cgg acc aat gac cct tgc ctt gga aat aaa tgc Pro Leu Cys Asp Gln Arg Thr Asn Asp Pro Cys Leu Gly Asn Lys Cys 1365 1370 1375	4128
gta cat ggc acc tgc ttg ccc atc aat gcg ttc tcc tac agc tgt aag Val His Gly Thr Cys Leu Pro Ile Asn Ala Phe Ser Tyr Ser Cys Lys 1380 1385 1390	4176
tgc ttg gag ggc cat gga ggt gtc ctc tgt gat gaa gag gag gat ctg Cys Leu Glu Gly His Gly Gly Val Leu Cys Asp Glu Glu Glu Asp Leu 1395 1400 1405	4224
ttt aac cca tgc cag gcg atc aag tgc aag cat ggg aag tgc agg ctt Phe Asn Pro Cys Gln Ala Ile Lys Cys Lys His Gly Lys Cys Arg Leu 1410 1415 1420	4272
tca ggt ctg ggg cag ccc tac tgt gaa tgc agc agt gga tac acg ggg Ser Gly Leu Gly Gln Pro Tyr Cys Glu Cys Ser Ser Gly Tyr Thr Gly 1425 1430 1435 1440	4320
gac agc tgt gat cga gaa atc tct tgt cga ggg gaa agg ata aga gat	4368

Asp Ser Cys Asp Arg Glu Ile Ser Cys Arg Gly Glu Arg Ile Arg Asp  
 1445 1450 1455  
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 Tyr Tyr Gln Lys Gln Gln Gly Tyr Ala Ala Cys Gln Thr Thr Lys Lys  
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 Val Ser Arg Leu Glu Cys Arg Gly Gly Cys Ala Gly Gly Gln Cys Cys  
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 Gly Pro Leu Arg Ser Lys Arg Arg Lys Tyr Ser Phe Glu Cys Thr Asp  
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 Gly Ser Ser Phe Val Asp Glu Val Glu Lys Val Val Lys Cys Gly Cys  
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 acg agg tgt gtg tcc taaacacact cccggcagct ctgtcttttg aaaaggttgt 4615  
 Thr Arg Cys Val Ser  
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 Ser Cys Ser Gly Ser Thr Val Asp Cys His Gly Leu Ala Leu Arg Ser  
 35 40 45  
 Val Pro Arg Asn Ile Pro Arg Asn Thr Glu Arg Leu Asp Leu Asn Gly  
 50 55 60  
 Asn Asn Ile Thr Arg Ile Thr Lys Thr Asp Phe Ala Gly Leu Arg His  
 65 70 75 80  
 Leu Arg Val Leu Gln Leu Met Glu Asn Lys Ile Ser Thr Ile Glu Arg  
 85 90 95  
 Gly Ala Phe Gln Asp Leu Lys Glu Leu Glu Arg Leu Arg Leu Asn Arg  
 100 105 110  
 Asn His Leu Gln Leu Phe Pro Glu Leu Leu Phe Leu Gly Thr Ala Lys  
 115 120 125  
 Leu Tyr Arg Leu Asp Leu Ser Glu Asn Gln Ile Gln Ala Ile Pro Arg  
 130 135 140  
 Lys Ala Phe Arg Gly Ala Val Asp Ile Lys Asn Leu Gln Leu Asp Tyr  
 145 150 155 160

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Asn	Gln	Ile	Ser	Cys	Ile	Glu	Asp	Gly	Ala	Phe	Arg	Ala	Leu	Arg	Asp	
				165					170					175		
Leu	Glu	Val	Leu	Thr	Leu	Asn	Asn	Asn	Asn	Ile	Thr	Arg	Leu	Ser	Val	
			180					185					190			
Ala	Ser	Phe	Asn	His	Met	Pro	Lys	Leu	Arg	Thr	Phe	Arg	Leu	His	Ser	
		195					200					205				
Asn	Asn	Leu	Tyr	Cys	Asp	Cys	His	Leu	Ala	Trp	Leu	Ser	Asp	Trp	Leu	
	210					215					220					
Arg	Lys	Arg	Pro	Arg	Val	Gly	Leu	Tyr	Thr	Gln	Cys	Met	Gly	Pro	Ser	
225					230					235					240	
His	Leu	Arg	Gly	His	Asn	Val	Ala	Glu	Val	Gln	Lys	Arg	Glu	Phe	Val	
				245					250					255		
Cys	Ser	Asp	Glu	Glu	Glu	Gly	His	Gln	Ser	Phe	Met	Ala	Pro	Ser	Cys	
			260					265					270			
Ser	Val	Leu	His	Cys	Pro	Ala	Ala	Cys	Thr	Cys	Ser	Asn	Asn	Ile	Val	
		275					280					285				
Asp	Cys	Arg	Gly	Lys	Gly	Leu	Thr	Glu	Ile	Pro	Thr	Asn	Leu	Pro	Glu	
	290					295					300					
Thr	Ile	Thr	Glu	Ile	Arg	Leu	Glu	Gln	Asn	Thr	Ile	Lys	Val	Ile	Pro	
305					310					315					320	
Pro	Gly	Ala	Phe	Ser	Pro	Tyr	Lys	Lys	Leu	Arg	Arg	Ile	Asp	Leu	Ser	
				325					330					335		
Asn	Asn	Gln	Ile	Ser	Glu	Leu	Ala	Pro	Asp	Ala	Phe	Gln	Gly	Leu	Arg	
			340					345					350			
Ser	Leu	Asn	Ser	Leu	Val	Leu	Tyr	Gly	Asn	Lys	Ile	Thr	Glu	Leu	Pro	
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Lys	Ser	Leu	Phe	Glu	Gly	Leu	Phe	Ser	Leu	Gln	Leu	Leu	Leu	Leu	Asn	
	370					375					380					
Ala	Asn	Lys	Ile	Asn	Cys	Leu	Arg	Val	Asp	Ala	Phe	Gln	Asp	Leu	His	
385					390					395					400	
Asn	Leu	Asn	Leu	Leu	Ser	Leu	Tyr	Asp	Asn	Lys	Leu	Gln	Thr	Ile	Ala	
				405				410						415		
Lys	Gly	Thr	Phe	Ser	Pro	Leu	Arg	Ala	Ile	Gln	Thr	Met	His	Leu	Ala	
			420					425					430			
Gln	Asn	Pro	Phe	Ile	Cys	Asp	Cys	His	Leu	Lys	Trp	Leu	Ala	Asp	Tyr	
		435					440					445				
Leu	His	Thr	Asn	Pro	Ile	Glu	Thr	Ser	Gly	Ala	Arg	Cys	Thr	Ser	Pro	
	450					455					460					
Arg	Arg	Leu	Ala	Asn	Lys	Arg	Ile	Gly	Gln	Ile	Lys	Ser	Lys	Lys	Phe	
465					470					475					480	
Arg	Cys	Ser	Gly	Thr	Glu	Asp	Tyr	Arg	Ser	Lys	Leu	Ser	Gly	Asp	Cys	
				485					490					495		
Phe	Ala	Asp	Leu	Ala	Cys	Pro	Glu	Lys	Cys	Arg	Cys	Glu	Gly	Thr	Thr	
			500					505					510			



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Val	Asp	Cys	Ser	Asn	Gln	Lys	Leu	Asn	Lys	Ile	Pro	Glu	His	Ile	Pro
		515					520					525			
Gln	Tyr	Thr	Ala	Glu	Leu	Arg	Leu	Asn	Asn	Asn	Glu	Phe	Thr	Val	Leu
	530					535					540				
Glu	Ala	Thr	Gly	Ile	Phe	Lys	Lys	Leu	Pro	Gln	Leu	Arg	Lys	Ile	Asn
545					550					555					560
Phe	Ser	Asn	Asn	Lys	Ile	Thr	Asp	Ile	Glu	Glu	Gly	Ala	Phe	Glu	Gly
				565					570					575	
Ala	Ser	Gly	Val	Asn	Glu	Ile	Leu	Leu	Thr	Ser	Asn	Arg	Leu	Glu	Asn
			580						585					590	
Val	Gln	His	Lys	Met	Phe	Lys	Gly	Leu	Glu	Ser	Leu	Lys	Thr	Leu	Met
		595					600					605			
Leu	Arg	Ser	Asn	Arg	Ile	Thr	Cys	Val	Gly	Asn	Asp	Ser	Phe	Ile	Gly
	610					615					620				
Leu	Ser	Ser	Val	Arg	Leu	Leu	Ser	Leu	Tyr	Asp	Asn	Gln	Ile	Thr	Thr
625					630					635					640
Val	Ala	Pro	Gly	Ala	Phe	Asp	Thr	Leu	His	Ser	Leu	Ser	Thr	Leu	Asn
				645					650						655
Leu	Leu	Ala	Asn	Pro	Phe	Asn	Cys	Asn	Cys	Tyr	Leu	Ala	Trp	Leu	Gly
			660					665					670		
Glu	Trp	Leu	Arg	Lys	Lys	Arg	Ile	Val	Thr	Gly	Asn	Pro	Arg	Cys	Gln
		675					680					685			
Lys	Pro	Tyr	Phe	Leu	Lys	Glu	Ile	Pro	Ile	Gln	Asp	Val	Ala	Ile	Gln
	690					695					700				
Asp	Phe	Thr	Cys	Asp	Asp	Gly	Asn	Asp	Asp	Asn	Ser	Cys	Ser	Pro	Leu
705					710					715					720
Ser	Arg	Cys	Pro	Thr	Glu	Cys	Thr	Cys	Leu	Asp	Thr	Val	Val	Arg	Cys
				725					730					735	
Ser	Asn	Lys	Gly	Leu	Lys	Val	Leu	Pro	Lys	Gly	Ile	Pro	Arg	Asp	Val
			740					745					750		
Thr	Glu	Leu	Tyr	Leu	Asp	Gly	Asn	Gln	Phe	Thr	Leu	Val	Pro	Lys	Glu
		755					760					765			
Leu	Ser	Asn	Tyr	Lys	His	Leu	Thr	Leu	Ile	Asp	Leu	Ser	Asn	Asn	Arg
	770					775					780				
Ile	Ser	Thr	Leu	Ser	Asn	Gln	Ser	Phe	Ser	Asn	Met	Thr	Gln	Leu	Leu
785					790					795					800
Thr	Leu	Ile	Leu	Ser	Tyr	Asn	Arg	Leu	Arg	Cys	Ile	Pro	Pro	Arg	Thr
				805					810					815	
Phe	Asp	Gly	Leu	Lys	Ser	Leu	Arg	Leu	Leu	Ser	Leu	His	Gly	Asn	Asp
			820					825					830		
Ile	Ser	Val	Val	Pro	Glu	Gly	Ala	Phe	Asn	Asp	Leu	Ser	Ala	Leu	Ser
		835					840					845			
His	Leu	Ala	Ile	Gly	Ala	Asn	Pro	Leu	Tyr	Cys	Asp	Cys	Asn	Met	Gln
	850					855					860				

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Trp	Leu	Ser	Asp	Trp	Val	Lys	Ser	Glu	Tyr	Lys	Glu	Pro	Gly	Ile	Ala	
865					870					875					880	
Arg	Cys	Ala	Gly	Pro	Gly	Glu	Met	Ala	Asp	Lys	Leu	Leu	Leu	Thr	Thr	
				885					890					895		
Pro	Ser	Lys	Lys	Phe	Thr	Cys	Gln	Gly	Pro	Val	Asp	Val	Asn	Ile	Leu	
				900				905					910			
Ala	Lys	Cys	Asn	Pro	Cys	Leu	Ser	Asn	Pro	Cys	Lys	Asn	Asp	Gly	Thr	
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Cys	Asn	Ser	Asp	Pro	Val	Asp	Phe	Tyr	Arg	Cys	Thr	Cys	Pro	Tyr	Gly	
	930					935					940					
Phe	Lys	Gly	Gln	Asp	Cys	Asp	Val	Pro	Ile	His	Ala	Cys	Ile	Ser	Asn	
945					950					955					960	
Pro	Cys	Lys	His	Gly	Gly	Thr	Cys	His	Leu	Lys	Glu	Gly	Glu	Glu	Asp	
				965					970					975		
Gly	Phe	Trp	Cys	Ile	Cys	Ala	Asp	Gly	Phe	Glu	Gly	Glu	Asn	Cys	Glu	
			980					985					990			
Val	Asn	Val	Asp	Asp	Cys	Glu	Asp	Asn	Asp	Cys	Glu	Asn	Asn	Ser	Thr	
		995					1000					1005				
Cys	Val	Asp	Gly	Ile	Asn	Asn	Tyr	Thr	Cys	Leu	Cys	Pro	Pro	Glu	Tyr	
	1010					1015					1020					
Thr	Gly	Glu	Leu	Cys	Glu	Glu	Lys	Leu	Asp	Phe	Cys	Ala	Gln	Asp	Leu	
1025					1030				1035						1040	
Asn	Pro	Cys	Gln	His	Asp	Ser	Lys	Cys	Ile	Leu	Thr	Pro	Lys	Gly	Phe	
				1045					1050					1055		
Lys	Cys	Asp	Cys	Thr	Pro	Gly	Tyr	Val	Gly	Glu	His	Cys	Asp	Ile	Asp	
		1060					1065						1070			
Phe	Asp	Asp	Cys	Gln	Asp	Asn	Lys	Cys	Lys	Asn	Gly	Ala	His	Cys	Thr	
	1075						1080					1085				
Asp	Ala	Val	Asn	Gly	Tyr	Thr	Cys	Ile	Cys	Pro	Glu	Gly	Tyr	Ser	Gly	
	1090					1095					1100					
Leu	Phe	Cys	Glu	Phe	Ser	Pro	Pro	Met	Val	Leu	Pro	Arg	Thr	Ser	Pro	
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Cys	Asp	Asn	Phe	Asp	Cys	Gln	Asn	Gly	Ala	Gln	Cys	Ile	Val	Arg	Ile	
			1125						1130					1135		
Asn	Glu	Pro	Ile	Cys	Gln	Cys	Leu	Pro	Gly	Tyr	Gln	Gly	Glu	Lys	Cys	
		1140						1145					1150			
Glu	Lys	Leu	Val	Ser	Val	Asn	Phe	Ile	Asn	Lys	Glu	Ser	Tyr	Leu	Gln	
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Ile	Pro	Ser	Ala	Lys	Val	Arg	Pro	Gln	Thr	Asn	Ile	Thr	Leu	Gln	Ile	
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Ala	Thr	Asp	Glu	Asp	Ser	Gly	Ile	Leu	Leu	Tyr	Lys	Gly	Asp	Lys	Asp	
1185					1190					1195					1200	
His	Ile	Ala	Val	Glu	Leu	Tyr	Arg	Gly	Arg	Val	Arg	Ala	Ser	Tyr	Asp	
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Thr Gly Ser His Pro Ala Ser Ala Ile Tyr Ser Val Glu Thr Ile Asn  
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 Asp Gly Asn Phe His Ile Val Glu Leu Leu Ala Leu Asp Gln Ser Leu  
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 Ser Leu Ser Val Asp Gly Gly Asn Pro Lys Ile Ile Thr Asn Leu Ser  
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 Lys Gln Ser Thr Leu Asn Phe Asp Ser Pro Leu Tyr Val Gly Gly Met  
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 Pro Gly Lys Ser Asn Val Ala Ser Leu Arg Gln Ala Pro Gly Gln Asn  
 1285 1290 1295  
 Gly Thr Ser Phe His Gly Cys Ile Arg Asn Leu Tyr Ile Asn Ser Glu  
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 Cys Glu Pro Cys His Lys Lys Val Cys Ala His Gly Thr Cys Gln Pro  
 1330 1335 1340  
 Ser Ser Gln Ala Gly Phe Thr Cys Glu Cys Gln Glu Gly Trp Met Gly  
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 Pro Leu Cys Asp Gln Arg Thr Asn Asp Pro Cys Leu Gly Asn Lys Cys  
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 Ser Gly Leu Gly Gln Pro Tyr Cys Glu Cys Ser Ser Gly Tyr Thr Gly  
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 Leu Glu Gln Asn Ser Ile Lys Ala Ile Pro Ala Gly Ala Phe Thr Gln  
 35 40 45  
 Tyr Lys Lys Leu Lys Arg Ile Asp Ile Ser Lys Asn Gln Ile Ser Asp  
 50 55 60  
 Ile Ala Pro Asp Ala Phe Gln Gly Leu Lys Ser Leu Thr Ser Leu Val  
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 Ser Gly Leu Lys Thr Leu Met Leu Arg Ser Asn Leu Ile Gly Cys Val  
 35 40 45  
 Ser Asn Asp Thr Phe Ala Gly Leu Ser Ser Val Arg Leu Leu Ser Leu  
 50 55 60  
 Tyr Asp Asn Arg Ile Thr Thr Ile Thr Pro Gly Ala Phe Thr Thr Leu  
 65 70 75 80  
 Val Ser Leu Ser Thr Ile Asn Leu Leu Ser Asn Pro Phe Asn Cys Asn  
 85 90 95  
 Cys His Leu Gly Ala Gly Leu Gly Lys Trp Leu Arg Lys Arg Arg Ile  
 100 105 110  
 Val Ser Gly Asn Pro Arg Cys Gln Lys Pro Phe Phe Leu Lys Glu Ile  
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 Pro Ile Gln Gly Val Gly His Pro Gly Ile  
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<223> note="Xaa signifies gap in sequence"

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Cys Met Asp Glu Val Asn Ser Tyr Ser Cys Leu Cys Ala Glu Gly Tyr  
35 40 45

Ser Gly Gln Leu Cys Glu Ile Pro Pro His Leu Pro Ala Pro Lys Ser  
50 55 60

Pro Cys Glu Gly Thr Glu Cys Gln Asn Gly Ala Asn Cys Val Asp Gln  
65 70 75 80

Gly Asn Arg Pro Val Cys Gln Cys Leu Pro Gly Phe Gly Gly Pro Glu  
85 90 95

Cys Glu Lys Leu Leu Ser Val Asn Phe Val Asp Arg Asp Thr Tyr Leu  
100 105 110

Gln Phe Thr Asp Leu Gln Asn Trp Xaa Arg Xaa Asn Ile Thr Leu Gln  
115 120 125

Val Phe Thr Ala Glu Asp Asn Gly Ile Leu Leu Tyr Asn Gly Gly Asn  
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Asp His Ile Ala Val Xaa Leu Tyr Xaa Gly His Val Arg Phe Ser Tyr  
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Val Val Arg Glu Val Ile Arg Arg Gln Lys Gly Tyr Ala Ser Cys Ala  
35 40 45

Thr Ala Ser Lys Val Pro Ile Met Glu Cys Arg Gly Gly Cys Gly Pro  
50 55 60

Gln Cys Cys Gln Pro Thr Arg Ser Lys Arg Arg Lys Tyr Val Phe Gln  
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<212> PRT  
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Gln	Leu	Arg	Leu	Leu	Ile	Leu	Pro	Ile	Leu	Leu	Leu	Leu	Arg	His	Asp
			20					25					30		
Ala	Val	His	Ala	Glu	Pro	Tyr	Ser	Gly	Gly	Phe	Gly	Ser	Ser	Ala	Val
		35					40					45			
Ser	Ser	Gly	Gly	Leu	Gly	Ser	Val	Gly	Ile	His	Ile	Pro	Gly	Gly	Gly
	50					55					60				
Val	Gly	Val	Ile	Thr	Glu	Ala	Arg	Cys	Pro	Arg	Val	Cys	Ser	Cys	Thr
65					70					75					80
Gly	Leu	Asn	Val	Asp	Cys	Ser	His	Arg	Gly	Leu	Thr	Ser	Val	Pro	Arg
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Lys	Ile	Ser	Ala	Asp	Val	Glu	Arg	Leu	Glu	Leu	Gln	Gly	Asn	Asn	Leu
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Thr	Val	Ile	Tyr	Glu	Thr	Asp	Phe	Gln	Arg	Leu	Thr	Lys	Leu	Arg	Met
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Leu	Gln	Leu	Thr	Asp	Asn	Gln	Ile	His	Thr	Ile	Glu	Arg	Asn	Ser	Phe
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Gln	Asp	Leu	Val	Ser	Leu	Glu	Arg	Leu	Asp	Ile	Ser	Asn	Asn	Val	Ile
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Thr	Thr	Val	Gly	Arg	Arg	Val	Phe	Lys	Gly	Ala	Gln	Ser	Leu	Arg	Ser
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Leu	Gln	Leu	Asp	Asn	Asn	Gln	Ile	Thr	Cys	Leu	Asp	Glu	His	Ala	Phe
			180					185					190		
Lys	Gly	Leu	Val	Glu	Leu	Glu	Ile	Leu	Thr	Leu	Asn	Asn	Asn	Asn	Leu
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Thr	Ser	Leu	Pro	His	Asn	Ile	Phe	Gly	Gly	Leu	Gly	Arg	Leu	Arg	Ala
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Leu	Arg	Leu	Ser	Asp	Asn	Pro	Phe	Ala	Cys	Asp	Cys	His	Leu	Ser	Trp
225					230					235					240
Leu	Ser	Arg	Phe	Leu	Arg	Ser	Ala	Thr	Arg	Leu	Ala	Pro	Tyr	Thr	Arg
				245					250					255	
Cys	Gln	Ser	Pro	Ser	Gln	Leu	Lys	Gly	Gln	Asn	Val	Ala	Asp	Leu	His
			260					265					270		
Asp	Gln	Glu	Phe	Lys	Cys	Ser	Gly	Leu	Thr	Glu	His	Ala	Pro	Met	Glu
		275					280					285			
Cys	Gly	Ala	Glu	Asn	Ser	Cys	Pro	His	Pro	Cys	Arg	Cys	Ala	Asp	Gly
	290					295					300				
Ile	Val	Asp	Cys	Arg	Glu	Lys	Ser	Leu	Thr	Ser	Val	Pro	Val	Thr	Leu
305					310					315					320
Pro	Asp	Asp	Thr	Thr	Asp	Val	Arg	Leu	Glu	Gln	Asn	Phe	Ile	Thr	Glu
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Leu	Pro	Pro	Lys	Ser	Phe	Ser	Ser	Phe	Arg	Arg	Leu	Arg	Arg	Ile	Asp
			340					345					350		
Leu	Ser	Asn	Asn	Asn	Ile	Ser	Arg	Ile	Ala	His	Asp	Ala	Leu	Ser	Gly
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Leu	Lys	Gln	Leu	Thr	Thr	Leu	Val	Leu	Tyr	Gly	Asn	Lys	Ile	Lys	Asp
	370					375					380				
Leu	Pro	Ser	Gly	Val	Phe	Lys	Gly	Leu	Gly	Ser	Leu	Arg	Leu	Leu	Leu
385					390					395					400
Leu	Asn	Ala	Asn	Glu	Ile	Ser	Cys	Ile	Arg	Lys	Asp	Ala	Phe	Arg	Asp
				405					410					415	
Leu	His	Ser	Leu	Ser	Leu	Leu	Ser	Leu	Tyr	Asp	Asn	Asn	Ile	Gln	Ser
			420					425					430		
Leu	Ala	Asn	Gly	Thr	Phe	Asp	Ala	Met	Lys	Ser	Met	Lys	Thr	Val	His
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Leu	Ala	Lys	Asn	Pro	Phe	Ile	Cys	Asp	Cys	Asn	Leu	Arg	Trp	Leu	Ala
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Ser	Pro	Lys	Arg	Met	His	Arg	Arg	Arg	Ile	Glu	Ser	Leu	Arg	Glu	Glu
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Lys	Phe	Lys	Cys	Ser	Trp	Gly	Glu	Leu	Arg	Met	Lys	Leu	Ser	Gly	Glu
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Cys	Arg	Met	Asp	Ser	Asp	Cys	Pro	Ala	Met	Cys	His	Cys	Glu	Gly	Thr
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Thr	Val	Asp	Cys	Thr	Gly	Arg	Arg	Leu	Lys	Glu	Ile	Pro	Arg	Asp	Ile
	530					535					540				
Pro	Leu	His	Thr	Thr	Glu	Leu	Leu	Leu	Asn	Asp	Asn	Glu	Leu	Gly	Arg
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Ile	Ser	Ser	Asp	Gly	Leu	Phe	Gly	Arg	Leu	Pro	His	Leu	Val	Lys	Leu
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Glu	Leu	Lys	Arg	Asn	Gln	Leu	Thr	Gly	Ile	Glu	Pro	Asn	Ala	Phe	Glu
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Gly	Ala	Ser	His	Ile	Gln	Glu	Leu	Gln	Leu	Gly	Glu	Asn	Lys	Ile	Lys
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Glu	Ile	Ser	Asn	Lys	Met	Phe	Leu	Gly	Leu	His	Gln	Leu	Lys	Thr	Leu
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Asn	Leu	Tyr	Asp	Asn	Gln	Ile	Ser	Cys	Val	Met	Pro	Gly	Ser	Phe	Glu
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His	Leu	Asn	Ser	Leu	Thr	Ser	Leu	Asn	Leu	Ala	Ser	Asn	Pro	Phe	Asn
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Cys	Asn	Cys	His	Leu	Ala	Trp	Phe	Ala	Glu	Cys	Val	Arg	Lys	Lys	Ser
			660					665					670		
Leu	Asn	Gly	Gly	Ala	Ala	Arg	Cys	Gly	Ala	Pro	Ser	Lys	Val	Arg	Asp
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Val	Gln	Ile	Lys	Asp	Leu	Pro	His	Ser	Glu	Phe	Lys	Cys	Ser	Ser	Glu
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Asn	Ser	Glu	Gly	Cys	Leu	Gly	Asp	Gly	Tyr	Cys	Pro	Pro	Ser	Cys	Thr
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Cys	Thr	Gly	Thr	Val	Val	Ala	Cys	Ser	Arg	Asn	Gln	Leu	Lys	Glu	Ile
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Pro	Arg	Gly	Ile	Pro	Ala	Glu	Thr	Ser	Glu	Leu	Tyr	Leu	Glu	Ser	Asn
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Glu	Ile	Glu	Gln	Ile	His	Tyr	Glu	Arg	Ile	Arg	His	Leu	Arg	Ser	Leu
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Thr	Arg	Leu	Asp	Leu	Ser	Asn	Asn	Gln	Ile	Thr	Ile	Leu	Ser	Asn	Tyr
	770					775					780				
Thr	Phe	Ala	Asn	Leu	Thr	Lys	Leu	Ser	Thr	Leu	Ile	Ile	Ser	Tyr	Asn
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Lys	Leu	Gln	Cys	Leu	Gln	Arg	His	Ala	Leu	Ser	Gly	Leu	Asn	Asn	Leu
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Arg	Val	Val	Ser	Leu	His	Gly	Asn	Arg	Ile	Ser	Met	Leu	Pro	Glu	Gly
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Pro	Leu	Tyr	Cys	Asp	Cys	Gly	Leu	Lys	Trp	Phe	Ser	Asp	Trp	Ile	Lys
	850					855					860				
Leu	Asp	Tyr	Val	Glu	Pro	Gly	Ile	Ala	Arg	Cys	Ala	Glu	Pro	Glu	Gln
865					870					875					880
Met	Lys	Asp	Lys	Leu	Ile	Leu	Ser	Thr	Pro	Ser	Ser	Ser	Phe	Val	Cys
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Arg	Gly	Arg	Val	Arg	Asn	Asp	Ile	Leu	Ala	Lys	Cys	Asn	Ala	Cys	Phe
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Glu	Gln	Pro	Cys	Gln	Asn	Gln	Ala	Gln	Cys	Val	Ala	Leu	Pro	Gln	Arg
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Glu	Tyr	Gln	Cys	Leu	Cys	Gln	Pro	Gly	Tyr	His	Gly	Lys	His	Cys	Glu
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Phe	Met	Ile	Asp	Ala	Cys	Tyr	Gly	Asn	Pro	Cys	Arg	Asn	Asn	Ala	Thr
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Cys	Thr	Val	Leu	Glu	Glu	Gly	Arg	Phe	Ser	Cys	Gln	Cys	Ala	Pro	Gly
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Ile	Lys	Cys	Gln	Asn	Asn	Ala	Thr	Cys	Ile	Asp	Gly	Val	Glu	Ser	Tyr
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Lys	Cys	Glu	Cys	Gln	Pro	Gly	Phe	Ser	Gly	Glu	Phe	Cys	Asp	Thr	Lys
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Ile	Gln	Phe	Cys	Ser	Pro	Glu	Phe	Asn	Pro	Cys	Ala	Asn	Gly	Ala	Lys
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Cys Met Asp His Phe Thr His Tyr Ser Cys Asp Cys Gln Ala Gly Phe  
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His Gly Thr Asn Cys Thr Asp Asn Ile Asp Asp Cys Gln Asn His Met  
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Cys Gln Asn Gly Gly Thr Cys Val Asp Gly Ile Asn Asp Tyr Gln Cys  
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Arg Cys Pro Asp Asp Tyr Thr Gly Lys Tyr Cys Glu Gly His Asn Met  
1090 1095 1100

Ile Ser Met Met Tyr Pro Gln Thr Ser Pro Cys Gln Asn His Glu Cys  
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Lys His Gly Val Cys Phe Gln Pro Asn Ala Gln Gly Ser Asp Tyr Leu  
1125 1130 1135

Cys Arg Cys His Pro Gly Tyr Thr Gly Lys Trp Cys Glu Tyr Leu Thr  
1140 1145 1150

Ser Ile Ser Phe Val His Asn Asn Ser Phe Val Glu Leu Glu Pro Leu  
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Arg Thr Arg Pro Glu Ala Asn Val Thr Ile Val Phe Ser Ser Ala Glu  
1170 1175 1180

Gln Asn Gly Ile Leu Met Tyr Asp Gly Gln Asp Ala His Leu Ala Val  
1185 1190 1195 1200

Glu Leu Phe Asn Gly Arg Ile Arg Val Ser Tyr Asp Val Gly Asn His  
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Pro Val Ser Thr Met Tyr Ser Phe Glu Met Val Ala Asp Gly Lys Tyr  
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His Ala Val Glu Leu Leu Ala Ile Lys Lys Asn Phe Thr Leu Arg Val  
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Asp Arg Gly Leu Ala Arg Ser Ile Ile Asn Glu Gly Ser Asn Asp Tyr  
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Leu Lys Leu Thr Thr Pro Met Phe Leu Gly Gly Leu Pro Val Asp Pro  
1265 1270 1275 1280

Ala Gln Gln Ala Tyr Lys Asn Trp Gln Ile Arg Asn Leu Thr Ser Phe  
1285 1290 1295

Lys Gly Cys Met Lys Glu Val Trp Ile Asn His Lys Leu Val Asp Phe  
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Gly Asn Ala Gln Arg Gln Gln Lys Ile Thr Pro Gly Cys Ala Leu Leu  
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Glu Gly Glu Gln Gln Glu Glu Glu Asp Asp Glu Gln Asp Phe Met Asp  
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Glu Thr Pro His Ile Lys Glu Glu Pro Val Asp Pro Cys Leu Glu Asn  
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Lys Cys Arg Arg Gly Ser Arg Cys Val Pro Asn Ser Asn Ala Arg Asp  
1365 1370 1375

Gly Tyr Gln Cys Lys Cys Lys His Gly Gln Arg Gly Arg Tyr Cys Asp  
1380 1385 1390

Gln Gly Glu Gly Ser Thr Glu Pro Pro Thr Val Thr Ala Ala Ser Thr  
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Ser Arg Gln Pro Leu Lys Tyr Ala Lys Cys Val Gly Gly Cys Gly Asn  
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Gln Cys Cys Ala Ala Lys Ile Val Arg Arg Arg Lys Val Arg Met Val  
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<223> note="Xaa signifies gap in sequence"

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Lys Arg Leu Arg Lys Lys Lys Phe Ala Thr Leu Pro Pro Asn Lys Phe  
35 40 45  
Lys Cys Lys Gly Ser Glu Ser Phe Val Ser Met Tyr Ala Asp Ser Cys  
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Phe Ile Asp Ser Ile Cys Pro Thr Gln Cys Asp Cys Tyr Gly Thr Thr  
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Val Asp Cys Asn Lys Arg Gly Leu Asn Thr Ile Pro Thr Ser Ile Pro  
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Arg Phe Ala Thr Gln Leu Leu Leu Ser Gly Asn Asn Ile Ser Thr Val  
100 105 110  
Asp Leu Asn Ser Asn Ile His Val Leu Glu Asn Leu Glu Xaa Leu Asp  
115 120 125  
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Leu Ser Lys Leu Arg Glu Leu Xaa Leu Asn Asp  
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Asp	Leu	Asn 35	Arg	Leu	Tyr	Ser	Leu 40	Thr	Lys	Leu	Asp	Leu 45	Ser	His	Asn	
Arg	Leu 50	Ile	Ser	Leu	Glu	Asn 55	Asn	Thr	Phe	Ser	Asn 60	Leu	Thr	Arg	Leu	
Ser 65	Thr	Leu	Ile	Ile	Ser 70	Tyr	Asn	Lys	Leu	Arg 75	Cys	Leu	Gln	Pro	Leu 80	
Ala	Phe	Asn	Gly	Leu 85	Asn	Ala	Leu	Arg	Ile 90	Leu	Ser	Leu	His	Gly 95	Asn	
Asp	Ile	Ser	Phe 100	Leu	Pro	Gln	Ser	Ala 105	Phe	Ser	Asn	Leu	Thr 110	Ser	Ile	
Thr	His	Ile 115	Ala	Val	Gly	Ser	Asn 120	Ser	Leu	Tyr	Cys	Asp 125	Cys	Asn	Met	
Ala	Trp 130	Phe	Ser	Lys	Trp	Ile 135	Lys	Ser	Lys	Phe	Ile 140	Glu	Ala	Gly	Ile	
Ala 145	Arg	Cys	Glu	Tyr	Pro 150	Asn	Thr	Val	Ser	Asn 155	Gln	Leu	Leu	Leu	Thr 160	
Ala	Gln	Pro	Tyr	Gln 165	Phe	Thr	Cys	Asp	Ser 170	Lys	Val	Pro	Thr	Lys 175	Leu	
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Ile	Cys	Glu 195	Thr	Thr	Ser	Ser	Arg 200	Lys	Tyr	Thr	Cys	Asn 205	Cys	Thr	Pro	
Gly	Phe 210	Tyr	Gly	Val	His	Cys 215	Glu	Asn	Gln	Ile	Asp 220	Ala	Cys	Tyr	Gly	
Ser 225	Pro	Cys	Leu	Asn	Asn 230	Ala	Thr	Cys	Lys	Val 235	Ala	Gln	Ala	Gly	Arg 240	
Phe	Asn	Cys	Tyr	Cys 245	Asn	Lys	Gly	Phe	Glu 250	Gly	Asp	Tyr	Cys	Glu 255	Lys	
Asn	Ile	Asp	Asp 260	Cys	Val	Asn	Ser	Lys 265	Cys	Glu	Asn	Gly	Gly 270	Lys	Cys	
Val	Asp	Leu 275	Val	Arg	Phe	Cys	Ser 280	Glu	Glu	Leu	Lys	Asn 285	Phe	Gln	Ser	
Phe	Gln 290	Ile	Asn	Ser	Tyr	Arg 295	Cys	Asp	Cys	Pro	Met 300	Glu	Tyr	Glu	Gly	
Lys 305	His	Cys	Glu	Asp	Lys 310	Leu	Glu	Tyr	Cys	Thr 315	Lys	Lys	Leu	Asn	Pro 320	
Cys	Glu	Asn	Asn	Gly 325	Lys	Cys	Ile	Pro	Ile 330	Asn	Gly	Ser	Tyr	Ser 335	Cys	
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Asp	Cys	Lys	Asn	Val	Glu	Cys	Gln	Asn	Gly	Gly	Ser	Cys	Val	Asp	Gly
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Ile	Leu	Ser	Tyr	Asp	Cys	Leu	Cys	Arg	Pro	Gly	Tyr	Ala	Gly	Gln	Tyr
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Cys	Glu	Ile	Pro	Pro	Met	Met	Asp	Met	Glu	Tyr	Gln	Lys	Thr	Asp	Ala
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Cys	Gln	Gln	Ser	Ala	Cys	Gly	Gln	Gly	Glu	Cys	Val	Ala	Ser	Gln	Asn
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Ser	Ser	Asp	Phe	Thr	Cys	Lys	Cys	His	Glu	Gly	Phe	Ser	Gly	Pro	Ser
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Ala	Leu	Asp	Pro	Leu	Ala	Ser	Asp	Gly	Thr	Ile	Thr	Met	Thr	Leu	Arg
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Thr	Thr	Ser	Lys	Ile	Gly	Ile	Leu	Leu	Tyr	Tyr	Gly	Asp	Asp	His	Phe
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Val	Ser	Ala	Glu	Leu	Tyr	Asp	Gly	Arg	Val	Lys	Leu	Val	Tyr	Tyr	Ile
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Gly	Asn	Phe	Pro	Ala	Ser	His	Met	Tyr	Ser	Ser	Val	Lys	Val	Asn	Asp
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Gly	Leu	Pro	His	Arg	Ile	Ser	Ile	Arg	Thr	Ser	Glu	Arg	Lys	Cys	Phe
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Ser	Asp	Gln	Leu	Ile	Thr	Lys	Gly	Lys	Glu	Met	Leu	Tyr	Ile	Gly	Gly
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Leu	Pro	Ile	Glu	Lys	Ser	Gln	Asp	Ala	Lys	Arg	Arg	Phe	His	Val	Lys
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Asn	Ser	Glu	Ser	Leu	Lys	Gly	Cys	Ile	Ser	Ser	Ile	Thr	Ile	Asn	Glu
			580					585					590		
Val	Pro	Ile	Asn	Leu	Gln	Gln	Ala	Leu	Glu	Asn	Val	Asn	Thr	Glu	Gln
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Ser	Cys	Ser	Ala	Thr	Val	Asn	Phe	Cys	Ala	Gly	Ile	Asp	Cys	Gly	Asn
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Gly	Lys	Cys	Thr	Asn	Asn	Ala	Leu	Ser	Pro	Lys	Gly	Tyr	Met	Cys	Gln
625					630					635					640
Cys	Asp	Ser	His	Phe	Ser	Gly	Glu	His	Cys	Asp	Glu	Lys	Arg	Ile	Lys
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Cys	Asp	Lys	Gln	Lys	Phe	Arg	Arg	His	His	Ile	Glu	Asn	Glu	Cys	Arg
			660					665					670		
Ser	Val	Asp	Arg	Ile	Lys	Ile	Ala	Glu	Cys	Asn	Gly	Tyr	Cys	Gly	Gly
		675					680					685			
Glu	Gln	Asn	Cys	Cys	Thr	Ala	Val	Lys	Lys	Lys	Gln	Arg	Lys	Val	Lys

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690 695 700

Met Ile Cys Lys Asn Gly Thr Thr Lys Ile Ser Thr Val His Ile Ile  
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Arg Gln Cys Gln Cys Glu Pro Thr Lys Ser Val Leu Ser Glu Lys  
725 730 735

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Gln Asn Gly Ala Gln Cys Val Asp Glu Val Asn Ser Tyr Ala Cys Leu  
35 40 45

Cys Val Glu Gly Tyr Ser Gly Gln Leu Cys Glu Ile Pro Pro Ala Pro  
50 55 60

Arg Ser Ser Cys Glu Gly Thr Glu Cys Gln Asn Gly Ala Asn Cys Val  
65 70 75 80

Asp Gln Gly Ser Arg Pro Val Cys Gln Cys Leu Pro Gly Phe Gly Gly  
85 90 95

Pro Glu Cys Glu Lys Leu Leu Ser Val Asn Phe Val Asp Arg Asp Thr  
100 105 110

Tyr Leu Gln Phe Thr Asp Leu Gln Asn Trp Pro Arg Ala Asn Ile Thr  
115 120 125

Leu Gln Val Ser Thr Ala Glu Asp Asn Gly Ile Leu Leu Tyr Asn Gly  
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Asp Asn Asp His Ile Ala Val Glu Leu Tyr  
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Pro Tyr Cys Leu Cys Gln Pro Gly Phe Ser Gly His His Cys Glu Gln  
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Glu Asn Pro Cys Met Gly Glu Ile Val Arg Glu Ala Ile Arg Arg Gln  
35 40 45

Lys Asp Tyr Ala Ser Cys Ala Thr Ala Ser Lys Val Pro Ile Met Glu  
50 55 60

Cys Arg Gly Gly Cys Gly Thr Thr Cys Cys Gln Pro Ile Arg Ser Lys  
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Arg Arg Lys Tyr Val Phe Gln Cys Thr Asp Gly Ser Ser Phe Val Glu  
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Glu Val Glu Arg His Leu Glu Cys Gly Cys Arg Ala Cys Ser  
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Arg Asn Asn Leu Gln Leu Phe Pro Glu Leu Leu Phe Leu Gly Thr Ala  
35 40 45

Arg Leu Tyr Arg Leu Asp Leu Ser Glu Asn Gln Ile Gln Ala Ile Pro  
50 55 60

Arg Lys Ala Phe Arg Gly Ala Val Asp Ile Lys Asn Leu Gln Leu Asp  
65 70 75 80

Tyr Asn Gln Ile Ser Cys Ile Glu Asp Gly Ala Phe Arg Ala Leu Arg  
85 90 95

Asp Leu Glu Val Leu Thr Leu Asn Asn Asn Ile Thr Arg Leu Ser  
100 105 110

Val Ala Ser Phe Asn His Met Pro Lys Leu Arg Thr Phe Arg Leu His  
115 120 125

Ser Asn Asn Leu Tyr Cys  
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Gly Leu Phe Cys Glu His Pro Pro Pro Met Val Leu Leu Gln Thr Ser  
35 40 45

Pro Cys Asp Gln Tyr Glu Cys Gln Asn Gly Ala Gln Cys Ile Val Val  
50 55 60

Gln Gln Glu Pro Thr Cys Arg Cys Pro Pro Gly Phe Ala Gly Pro Arg  
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Cys Glu Lys Leu Ile Thr Val Asn Phe Val Gly Lys Asp Ser Tyr Val  
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Glu Leu Ala Ser Ala Lys Val Arg  
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Asp Phe Arg Lys Met Pro Met Gln Thr Gly Ile Leu Pro Gly Cys Glu  
35 40 45  
Pro Cys His Lys Lys Val Cys Ala His Gly Cys Cys Gln Pro Ser Ser  
50 55 60  
Gln Ser Gly Phe Thr Cys Glu Cys Glu Glu Gly Trp Met Gly Pro Leu  
65 70 75 80  
Cys Asp Gln Arg Thr Asn Asp Pro Cys Leu Gly Asn Lys Cys Val His  
85 90 95  
Gly Thr Cys Leu Pro Ile Asn Ala Phe Ser Tyr Ser Cys Lys Cys Leu  
100 105 110  
Glu Gly His Gly Gly Val Leu Cys Asp Glu Glu Glu Asp Leu Phe Asn  
115 120 125  
Pro Cys Gln Met Ile Lys Cys Lys His Gly Lys Cys Arg Leu Ser Gly  
130 135 140  
Val Gly Gln Pro Tyr Cys Glu Cys Asn Ser Gly Phe Thr Gly Asp Ser  
145 150 155 160  
Cys Asp Arg Glu Ile Ser Cys Arg Gly Glu Arg Ile Arg Asp Tyr Tyr  
165 170 175  
Gln Lys Gln Gln Gly Tyr Ala Ala Cys Gln Thr Thr Lys Lys Val Ser  
180 185 190  
Arg Leu Glu Cys Arg Gly Gly Cys Ala Gly Gly Gln Cys Cys Gly Pro  
195 200 205  
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Ser Phe Val Asp Glu Val Glu Lys Val Val Lys Cys Gly Cys Ala Arg  
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Cys Ala Ser

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Met His Pro Met His Pro Glu Asn His Ala Ile Ala Arg Ser Thr Ser

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	Val	Arg	Gly	Gln	Tyr	Gln	Ser	Pro	Arg	Ile	Ile	Glu	His	Pro	Thr	Asp			
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	Leu	Phe	Phe	Tyr	Arg	Thr	Met	Gln	Gly	Lys	Lys	Glu	Gln	Asp	Gly	Gly			
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	Pro	Lys	Asp	Thr	Arg	Val	Ala	Lys	Gly	Glu	Thr	Ala	Leu	Leu	Glu	Cys			
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Val	Ile	His	Ser	Arg	Arg	Glu	Ser	Asp	Ala	Gly	Thr	Tyr	Trp	Cys	Glu
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Ser	Pro	Glu	Pro	Gln	Ile	Ser	Trp	Arg	Lys	Asn	Gly	Gln	Thr	Leu	Asn
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Leu	Val	Gly	Asn	Lys	Arg	Ile	Arg	Ile	Val	Asp	Gly	Gly	Asn	Leu	Ala

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His	Val	Arg	Pro	Phe	Leu	Ile	Arg	Gly	Pro	Gln	Asn	Gln	Thr	Ala	Val			
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	Gln	Ser	Ile	Lys	Tyr	Leu	Ile	Ser	Ala	Val	Thr	Gly	Asn	Thr	Pro				
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	Leu	Lys	Lys	Pro	Asp	Thr	Gly	Val	Tyr	Thr	Cys	Ile	Ala	Lys	Asn	Glu			
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		530					535					540							
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	Leu	His	Trp	Asn	Ala	Pro	Ser	Thr	Ser	Gly	Ala	Gly	Pro	Ile	Thr	Gly			
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	Tyr	Ile	Ile	Gln	Tyr	Tyr	Ser	Pro	Asp	Leu	Gly	Gln	Thr	Trp	Phe	Asn			
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	Ala	Ala	Gln	Val	Ala	Leu	Ser	Asp	Lys	Asn	Lys	Met	Asp	Met	Ala	Ile			
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	Ala	Glu	Lys	Arg	Leu	Thr	Ser	Glu	Gln	Leu	Ile	Lys	Leu	Glu	Glu	Val			
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			740						745					750					
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			755					760					765						
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785						790				795						800			
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	Gln	Ile	Val	Ile	Val	Gly	Gln	Ala	Pro	Asn	Asn	Asn	Arg	Asn	Ile	Thr			
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Lys	His	Leu	Ala	Ala	Gln	Gln	Glu	Asn	Glu	Ser	Phe	Leu	Tyr	Gly	Leu		
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Ile	Asn	Lys	Ser	His	Val	Pro	Val	Ile	Val	Ile	Val	Ala	Ile	Leu	Ile		
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Gln	Asn	Pro	Met	Tyr	Asn	Thr	Ala	Gly	Arg	Met	Thr	Met	Asn	Asn	Arg		
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His	His	Tyr	His	Tyr	Ala	Gln	Leu	Thr	Gly	Gly	Pro	Gly	Asn	Ala	Met		
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Ser	Thr	Phe	Tyr	Gly	Asn	Gln	Tyr	His	Asp	Asp	Pro	Ser	Pro	Tyr	Ala		
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Ser	Arg	Ala	Ser	Asp	Gly	Arg	Gly	Thr	Leu	Asn	Gly	Gly	Leu	His	His		
	1090					1095					1100						
Arg	Thr	Ser	Gly	Ser	Gln	Arg	Ser	Asp	Ser	Pro	Pro	His	Thr	Asp	Val		
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Ser	Tyr	Val	Gln	Leu	His	Ser	Ser	Asp	Gly	Thr	Gly	Ser	Ser	Lys	Glu		
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Lys	Gly	Lys	Arg	Asp	Asp	Asp	Ser	Gln	Arg	Ser	Ser	Leu	Met	Met	Asp		
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Val	Pro	Arg	Gly	Gly	Val	Arg	Lys	Ala	Val	Pro	Arg	Met	Gly	Ile	Ser		
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Ala	Ser	Thr	Leu	Ala	His	Ser	Cys	Tyr	Gly	Thr	Asn	Gly	Thr	Ala	Gln		
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 Leu Ser Pro Asn His Leu Phe Leu Ala Gln Leu Ile Pro Asp Pro Glu

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Asp	Val	Glu	Arg	Gly	Asn	Asp	His	Gly	Thr	Pro	Ile	Pro	Thr	Ser	Asp
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Asn	Asp	Asp	Asn	Ser	Leu	Gly	Tyr	Thr	Gly	Ser	Arg	Leu	Arg	Gln	Glu
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Asp	Phe	Pro	Pro	Arg	Ile	Val	Glu	His	Pro	Ser	Asp	Leu	Ile	Val	Ser
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Lys	Gly	Glu	Pro	Ala	Thr	Leu	Asn	Cys	Lys	Ala	Glu	Gly	Arg	Pro	Thr
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Pro	Thr	Ile	Glu	Trp	Tyr	Lys	Gly	Gly	Glu	Arg	Val	Glu	Thr	Asp	Lys
			100					105					110		
Asp	Asp	Pro	Arg	Ser	His	Arg	Met	Leu	Leu	Pro	Ser	Gly	Ser	Leu	Phe
		115					120					125			
Phe	Leu	Arg	Ile	Val	His	Gly	Arg	Lys	Ser	Arg	Pro	Asp	Glu	Gly	Val
	130					135					140				
Tyr	Val	Cys	Val	Ala	Arg	Asn	Tyr	Leu	Gly	Glu	Ala	Val	Ser	His	Asn
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Ala	Ser	Leu	Glu	Val	Ala	Ile	Leu	Arg	Asp	Asp	Phe	Arg	Gln	Asn	Pro
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Ser	Asp	Val	Met	Val	Ala	Val	Gly	Glu	Pro	Ala	Val	Met	Glu	Cys	Gln
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Pro	Pro	Arg	Gly	His	Pro	Glu	Pro	Thr	Ile	Ser	Trp	Lys	Lys	Asp	Gly
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Ser	Pro	Leu	Asp	Asp	Lys	Asp	Glu	Arg	Ile	Thr	Ile	Arg	Gly	Gly	Lys
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Leu	Met	Ile	Thr	Tyr	Thr	Arg	Lys	Ser	Asp	Ala	Gly	Lys	Tyr	Val	Cys
225					230					235					240
Val	Gly	Thr	Asn	Met	Val	Gly	Glu	Arg	Glu	Ser	Glu	Val	Ala	Glu	Leu
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Thr	Val	Leu	Glu	Arg	Pro	Ser	Phe	Val	Lys	Arg	Pro	Ser	Asn	Leu	Ala
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Val	Thr	Val	Asp	Asp	Ser	Ala	Glu	Phe	Lys	Cys	Glu	Ala	Arg	Gly	Asp
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Pro	Val	Pro	Thr	Val	Arg	Trp	Arg	Lys	Asp	Asp	Gly	Glu	Leu	Pro	Lys
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Ser	Arg	Tyr	Glu	Ile	Arg	Asp	Asp	His	Thr	Leu	Lys	Ile	Arg	Lys	Val
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Thr	Ala	Gly	Asp	Met	Gly	Ser	Tyr	Thr	Cys	Val	Ala	Glu	Asn	Met	Val
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Gly	Lys	Ala	Glu	Ala	Ser	Ala	Thr	Leu	Thr	Val	Gln	Glu	Pro	Pro	His
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Phe	Val	Val	Lys	Pro	Arg	Asp	Gln	Val	Val	Ala	Leu	Gly	Arg	Thr	Val
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Thr	Phe	Gln	Cys	Glu	Ala	Thr	Gly	Asn	Pro	Gln	Pro	Ala	Ile	Phe	Trp
	370					375					380				
Arg	Arg														



Pro	Ser	Ala	Pro	Ser	Lys	Pro	Glu	Val	Thr	Asp	Val	Ser	Arg	Asn	Thr
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Val	Thr	Leu	Ser	Trp	Gln	Pro	Asn	Leu	Asn	Ser	Gly	Ala	Thr	Pro	Thr
			580					585					590		
Ser	Tyr	Ile	Ile	Glu	Ala	Phe	Ser	His	Ala	Ser	Gly	Ser	Ser	Trp	Gln
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Thr	Val	Ala	Glu	Asn	Val	Lys	Thr	Glu	Thr	Ser	Ala	Ile	Lys	Gly	Leu
	610					615					620				
Lys	Pro	Asn	Ala	Ile	Tyr	Leu	Phe	Leu	Val	Arg	Ala	Ala	Asn	Ala	Tyr
	625				630					635					640
Gly	Ile	Ser	Asp	Pro	Ser	Gln	Ile	Ser	Asp	Pro	Val	Lys	Thr	Gln	Asp
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Val	Leu	Pro	Thr	Ser	Gln	Gly	Val	Asp	His	Lys	Gln	Val	Gln	Arg	Glu
			660					665					670		
Leu	Gly	Asn	Ala	Val	Leu	His	Leu	His	Asn	Pro	Thr	Val	Leu	Ser	Ser
		675					680					685			
Ser	Ser	Ile	Glu	Val	His	Trp	Thr	Val	Asp	Gln	Gln	Ser	Gln	Tyr	Ile
	690					695					700				
Gln	Gly	Tyr	Lys	Ile	Leu	Tyr	Arg	Pro	Ser	Gly	Ala	Asn	His	Gly	Glu
	705				710					715					720
Ser	Asp	Trp	Leu	Val	Phe	Glu	Val	Arg	Thr	Pro	Ala	Lys	Asn	Ser	Val
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Val	Ile	Pro	Asp	Leu	Arg	Lys	Gly	Val	Asn	Tyr	Glu	Ile	Lys	Ala	Arg
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Pro	Phe	Phe	Asn	Glu	Phe	Gln	Gly	Ala	Asp	Ser	Glu	Ile	Lys	Phe	Ala
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Lys	Thr	Leu	Glu	Glu	Ala	Pro	Ser	Ala	Pro	Pro	Gln	Gly	Val	Thr	Val
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Ser	Lys	Asn	Asp	Gly	Asn	Gly	Thr	Ala	Ile	Leu	Val	Ser	Trp	Gln	Pro
	785				790					795					800
Pro	Pro	Glu	Asp	Thr	Gln	Asn	Gly	Met	Val	Gln	Glu	Tyr	Lys	Val	Trp
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Cys	Leu	Gly	Asn	Glu	Thr	Arg	Tyr	His	Ile	Asn	Lys	Thr	Val	Asp	Gly
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Ser	Thr	Phe	Ser	Val	Val	Ile	Pro	Phe	Leu	Val	Pro	Gly	Ile	Arg	Tyr
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Ser	Val	Glu	Val	Ala	Ala	Ser	Thr	Gly	Ala	Gly	Ser	Gly	Val	Lys	Ser
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Glu	Pro	Gln	Phe	Ile	Gln	Leu	Asp	Ala	His	Gly	Asn	Pro	Val	Ser	Pro
	865				870					875					880
Glu	Asp	Gln	Val	Ser	Leu	Ala	Gln	Gln	Ile	Ser	Asp	Val	Val	Lys	Gln
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Pro	Ala	Phe	Ile	Ala	Gly	Ile	Gly	Ala	Ala	Cys	Trp	Ile	Ile	Leu	Met
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Thr	Ser	Thr	Tyr	Ala	Gly	Ile	Arg	Lys	Val	Pro	Ser	Phe	Thr	Phe	Thr
	930					935					940				
Pro	Thr	Val	Thr	Tyr	Gln	Arg	Gly	Gly	Glu	Ala	Val	Ser	Ser	Gly	Gly
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Arg	Pro	Gly	Leu	Leu	Asn	Ile	Ser	Glu	Pro	Ala	Ala	Gln	Pro	Trp	Leu
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Ala	Asp	Thr	Trp	Pro	Asn	Thr	Gly	Asn	Asn	His	Asn	Asp	Cys	Ser	Ile
			980					985					990		
Ser	Cys	Cys	Thr	Ala	Gly	Asn	Gly	Asn	Ser	Asp	Ser	Asn	Leu	Thr	Thr
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Tyr	Ser	Arg	Pro	Ala	Asp	Cys	Ile	Ala	Asn	Tyr	Asn	Asn	Gln	Leu	Asp
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Asn	Lys	Gln	Thr	Asn	Leu	Met	Leu	Pro	Glu	Ser	Thr	Val	Tyr	Gly	Asp
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Val	Asp	Leu	Ser	Asn	Lys	Ile	Asn	Glu	Met	Lys	Thr	Phe	Asn	Ser	Pro
				1045					1050					1055	
Asn	Leu	Lys	Asp	Gly	Arg	Phe	Val	Asn	Pro	Ser	Gly	Gln	Pro	Thr	Pro
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Tyr	Ala	Thr	Thr	Gln	Leu	Ile	Gln	Ser	Asn	Leu	Ser	Asn	Asn	Met	Asn
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Gln Lys Gln Glu Val	Ala Pro Val Gln Tyr	Asn Ile Val Glu Gln Asn
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Lys Leu Asn Lys Asp	Tyr Arg Ala Asn Asp	Thr Val Pro Pro Thr Ile
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Pro Tyr Asn Gln Ser	Tyr Asp Gln Asn Thr	Gly Gly Ser Tyr Asn Ser
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Ser Asp Arg Gly Ser	Ser Thr Ser Gly Ser	Gln Gly His Lys Lys Gly
1155	1160	1165
Ala Arg Thr Pro Lys	Val Pro Lys Gln Gly	Gly Met Asn Trp Ala Asp
1170	1175	1180
Leu Leu Pro Pro Pro	Pro Ala His Pro Pro	Pro His Ser Asn Ser Glu
1185	1190	1195
Glu Tyr Asn Ile Ser	Val Asp Glu Ser Tyr	Asp Gln Glu Met Pro Cys
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Pro Val Pro Pro Ala	Arg Met Tyr Leu Gln	Gln Asp Glu Leu Glu Glu
1220	1225	1230
Glu Glu Asp Glu Arg	Gly Pro Thr Pro Pro	Val Arg Gly Ala Ala Ser
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Ser Pro Ala Ala Val	Ser Tyr Ser His Gln	Ser Thr Ala Thr Leu Thr
1250	1255	1260
Pro Ser Pro Gln Glu	Glu Leu Gln Pro Met	Leu Gln Asp Cys Pro Glu
1265	1270	1275
Glu Thr Gly His Met	Gln His Gln Pro Asp	Arg Arg Arg Gln Pro Val
1285	1290	1295
Ser Pro Pro Pro Pro	Pro Arg Pro Ile Ser	Pro Pro His Thr Tyr Gly
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Tyr Ile Ser Gly Pro	Leu Val Ser Asp Met	Asp Thr Asp Ala Pro Glu
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Glu Glu Glu Asp Glu	Ala Asp Met Glu Val	Ala Lys Met Gln Thr Arg
1330	1335	1340
Arg Leu Leu Leu Arg	Gly Leu Glu Gln Thr	Pro Ala Ser Ser Val Gly
1345	1350	1355
Asp Leu Glu Ser Ser	Val Thr Gly Ser Met	Ile Asn Gly Trp Gly Ser
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Ala Ser Glu Glu Asp	Asn Ile Ser Ser Gly	Arg Ser Ser Val Ser Ser
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Ser Asp Gly Ser Phe	Phe Thr Asp Ala Asp	Phe Ala Gln Ala Val Ala
1395	1400	1405
Ala Ala Ala Glu Tyr	Ala Gly Leu Lys Val	Ala Arg Arg Gln Met Gln
1410	1415	1420
Asp Ala Ala Gly Arg	Arg His Phe His Ala	Ser Gln Cys Pro Arg Pro
1425	1430	1435
Thr Ser Pro Val Ser	Thr Asp Ser Asn Met	Ser Ala Ala Val Met Gln
1445	1450	1455
Lys Thr Arg Pro Ala	Lys Lys Leu Lys His	Gln Pro Gly His Leu Arg
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Arg Glu Thr Tyr Thr	Asp Asp Leu Pro Pro	Pro Pro Val Pro Pro Pro
1475	1480	1485
Ala Ile Lys Ser Pro	Thr Ala Gln Ser Lys	Thr Gln Leu Glu Val Arg
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Pro Val Val Val Pro	Lys Leu Pro Ser Met	Asp Ala Arg Thr Asp Arg
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Ser Ser Asp Arg Lys	Gly Ser Ser Tyr Lys	Gly Arg Glu Val Leu Asp
1525	1530	1535
Gly Arg Gln Val Val	Asp Met Arg Thr Asn	Pro Gly Asp Pro Arg Glu
1540	1545	1550
Ala Gln Glu Gln Gln	Asn Asp Gly Lys Gly	Arg Gly Asn Lys Ala Ala
1555	1560	1565
Lys Arg Asp Leu Pro	Pro Ala Lys Thr His	Leu Ile Gln Glu Asp Ile
1570	1575	1580
Leu Pro Tyr Cys Arg	Pro Thr Phe Pro Thr	Ser Asn Asn Pro Arg Asp
1585	1590	1595
Pro Ser Ser Ser Ser	Ser Met Ser Ser Arg	Gly Ser Gly Ser Arg Gln
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Arg Glu Gln Ala Asn	Val Gly Arg Arg Asn	Ile Ala Glu Met Gln Val
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Leu Gly Gly Tyr Glu Arg Gly Glu Asp Asn Asn Glu Glu Leu Glu Glu  
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Ala	Leu	Leu	Lys	Cys	Lys	Ala	Thr	Gly	Asp	Pro	Leu	Pro	Val	Ile	Ser
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Thr	Gly	Thr	Tyr	Thr	Cys	Val	Ala	Thr	Ser	Ser	Ser	Gly	Glu	Ala	Ser
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Trp	Ser	Ala	Val	Leu	Asp	Val	Thr	Glu	Ser	Gly	Ala	Thr	Ile	Ser	Lys
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Asn	Tyr	Asp	Leu	Ser	Asp	Leu	Pro	Gly	Pro	Pro	Ser	Lys	Pro	Gln	Val
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Pro	Gly	Thr	Leu	Pro	Ala	Ser	Ala	Tyr	Ile	Ile	Glu	Ala	Phe	Ser	Gln
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Ser	Val	Ser	Asn	Ser	Trp	Gln	Thr	Val	Ala	Asn	His	Val	Lys	Thr	Thr
			245						250					255	
Leu	Tyr	Thr	Val	Arg	Gly	Leu	Arg	Pro	Asn	Thr	Ile	Tyr	Leu	Phe	Met
			260					265					270		
Val	Arg	Ala	Ile	Asn	Pro	Lys	Val	Ser	Val	Thr	Gln	Xaa	Lys	Pro	Gln
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Val	Gln	Pro	Leu	Pro	Gly	Thr	Glu	Leu	Glu	His	Tyr	Ala	Val	Glu	Gln
305					310					315					320
Gln	Glu	Asn	Gly	Tyr	Asp	Ser	Asp	Ser	Trp	Cys	Pro	Pro	Leu	Pro	Val
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Gln	Thr	Tyr	Leu	His	Gln	Gly	Leu	Glu	Asp	Glu	Leu	Glu	Glu	Asp	Asp
			340					345					350		
Asp	Arg	Val	Pro	Thr	Pro	Pro	Val	Arg	Gly	Val	Ala	Ser	Ser	Pro	Ala
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Ile	Ser	Phe	Gly	Gln	Gln	Ser	Thr	Ala	Thr	Leu	Thr	Pro	Ser	Pro	Arg
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Glu	Glu	Met	Gln	Pro	Met	Leu	Gln	Ala	Ser	Pro	Xaa	Phe	Thr	Ser	Ser

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 Ala Val Val Ile Gln Lys Ala Arg Pro Ala Lys Lys Gln Lys His Gln  
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 Pro Gly His Leu Arg Arg Glu Ala Tyr Ala Asp Asp Leu Pro Pro Pro  
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 Pro Val Pro Pro Pro Ala Ile Lys Ser Pro Thr Val Gln Ser Lys Ala  
 85 90 95  
 Gln Leu Glu Val Arg Pro Val Met Val Pro Lys Leu Ala Ser Ile Glu  
 100 105 110  
 Ala Arg Thr Asp Arg Ser Ser Asp Arg Lys Gly Gly Ser Tyr Lys Gly  
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 Arg Glu Ala Leu Asp Gly Arg Gln Val Thr Asp Leu Arg Thr Asn Pro  
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 Ser Asp Pro Arg  
 145

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